

# TECHNICAL LITERACY SERIES

**COMPUTER**  
VU-CALC GUIDE



National Education Corporation



# VU-CALC

© PSION

LOAD TIME: 2 Min., 30 Sec.

Load and Run by typing LOAD "VU-CALC"

Pocket calculators have become a powerful and indispensable tool to many though they only work out and display one number at a time. They are useful because there are many things in life that are well described by a single number. There are many more things, however, which can be described more fully and completely with a table or an array of numbers organized in an ordered way.

VU-CALC is a program for calculating and displaying tables of numbers and names. You start with an empty table or grid composed of boxes and arranged in rows and columns. With a simple set of commands you can invoke calculator-like formulae which link one box to another or one row to another or one column to another so that the computer can calculate a whole table in a few seconds. You can also enter data or names into particular boxes and by simply changing one or more parameters, tables for different situations can be re-evaluated and displayed almost immediately.

This provides an immensely powerful tool for financial analysis, budgets, the calculation of engineering or scientific tables, statistical analyses etc.

## THE MAIN MENU

After you have loaded the program the main menu will appear on the screen with the following options:

- E — enter the program with a blank table
- C — continue to return to the table with the existing data and formulae
- S — save the program with the existing data and formulae on cassette
- W — save the program by itself with no data and formulae

If you are starting from the original cassette, or for a fresh problem, press the key "E" to enter the blank table. You can always return to the main menu later (with the "Q" command) if you wish to save a standard table with particular formulae or particular data.

## THE TABLE

After you have pressed the "E" option you will find the top left-hand corner of the whole table displayed on the screen; you will see that the rows are labeled alphabetically from A to Z and the columns are labeled numerically from 01 to 36. The whole table consists therefore of 26 rows by 36 columns. Each box or square is uniquely identified by the row letter followed by the column number. Thus, B03 would refer to the box lying in the second row down and the third column across. The box A01 in the top left-hand corner of the table plays a special role and is also given a special name "home."

## **THE CURSOR AND WINDOW**

After entering the table, a grey box can be seen in the "home" box A01. This is the cursor which shows the user the current box. The cursor can be moved freely and rapidly around the table to read or enter data, names, or formulae. The cursor is moved on the table by pressing the 4 arrow cursor keys on the keyboard. For example, if you press the arrow (key 6) lightly, the cursor will move one box down from A01 to B01. If you press and hold one of the cursor keys down firmly, the grey cursor on the table will move rapidly from box to box in the direction of the arrow. By this means, you can move rapidly around the table.

The full table available is very large with 26 rows by 36 columns, namely 936 boxes. At any time only a small part or "window" of the full table is shown on the screen. When the cursor reaches a box at the edge of the window and the cursor keys are pressed further, the window will automatically move over the table. If, at any time, you wish to return to the top left hand window of the table and place the cursor at the home position, A01, press the key H (for home).

In addition to the table you will see on the top line of the display, a black command panel with important commands or current instructions.

## **ENTERING DATA OR NAMES**

Each box in the table can display up to 8 characters which may be a name or number. You may enter a name or number directly into any box. Using the cursor keys the arrows move the cursor to the box you require. The command box will show F —FORMULA, L —DATA, C —CALCULATE. To enter name or data in the current box press the key L to load data or names. After you have pressed L, one square grey character cursor will appear in the current box and a new heading will appear saying "LOAD DATA TITLES." You may now enter any 8 character alphanumeric name or a number. As you enter the number or name, the characters will immediately appear in the current box and the character cursor will shift its position to the right as you proceed. When you have finished entering the name or number, press ENTER to exit from the L command back to the main table menu. If you attempt to enter more than 8 characters the program will truncate your name or number in 8 characters and return to the table menu.

## **ENTERING FORMULAE**

The real power of VU-CALC comes from the use of formulae for boxes, rows or columns which can generate the data you require for your table. The syntax of a formula includes the use of constants (numbers), references to the numbers in other boxes, and the simple arithmetic operators.

The numbers in another box are always referred to by the box reference of the row letter followed by the column number.

If you wish to use a formula to calculate a number in a particular box, first move the cursor to the box where you wish to generate the number. Press the key "F" for the command formula. You may now enter the formula you require. For example, if the cursor was at box A03 and you wished this box always to show the sum of the numbers in boxes A01 and A02, enter on the keyboard  $A01 + A02$  and terminate the formula by pressing ENTER. In constructing formulae, you may think of the box references as variables, and the formulae as simple algebraic expressions using these variables, constants and the arithmetic operators. Some examples of other formulae are:

B01 — 1.03  
E04 — B02 — 1.5  
D07 — C07

A formula can refer to one particular box or it may be repeated along a row or down a column. After you have entered a formula at a particular box and pressed ENTER, the heading will change to MOVE BY (R)OW, (C)OLUMN OR (E)XIT. Press E if the formula is to apply only to the current box and you will then return to the main command heading of the table. Press C if the formula is to apply from column to column along a row (across). Press R if the formula is to apply from row to row down a column. If the "R" or "C" options are chosen the heading will ask to which row or column the formula is to apply. In response enter a letter or a 2 digit number respectively. All the boxes between the current box and the box in the row or column you select will then use the same formula. You must always choose a row which is below the current row in the down direction. You must always choose a column which is to the right of the current column.

After entering the row letter or column numbers the command box will ask you whether the formula is to be relative or absolute. The difference between these two concepts is analagous to the difference between compound interest or simple interest. If the A for absolute option is chosen, the same formula with the same box numbers will be repeated along the row or column you have defined. On the other hand, if the R for relative is chosen, the same formula is applied along the row or column but with the box references incremented by one as you proceed from one box to the next along one row or column. For example, if we had entered data in Box A01, we may wish to increment the number in a compound sense along an entire row (A01 to A36). The box cursor is set at A02 and a formula entered there: for a compound interest of 1%, we would enter the formula at A02 of " $1.01 * A01$ ." After pressing ENTER, the C option is specified to column 36. The R for relative option is then specified, and the relative formula is then applied along the entire row. Thus, the effective formula in box A02 will be  $1.01 * A01$ . The formula in box A03 will be  $1.01 * A02$ . In box A04 the formula will be  $1.01 * A03$  etc. If the A for absolute option had been chosen the formula " $1.01 * A01$ " would have been repeated in every box from A02 to A36.

On occasion, it may be necessary to include both relative and absolute references in a

formula. This may be done by choosing the R for relative option but for those box references which are to be absolute, prefix them with the dollar sign.

After you have entered a set of formulae, as the box moves over the table the formula which applies to the current cursor box will be displayed in the bottom left hand corner of the screen. This is very important and useful in checking where formulae are and what they are in a particular box.

You may use up to 40 formulae and each formula can use up to 32 characters.

## **CALCULATING**

Once data and appropriate formulae have been entered, the table with numerical values and names may be calculated with the "C" for calculate command. The screen will go blank as the TS1500 operates in fast mode to generate the whole table. The table will then reappear with these numerical values and may be scanned as before by moving the cursor. You may subsequently amend one or more pieces of data or a formula to generate table after table. This is where the power of this program manifests itself in that by changing one parameter, a completely new table can be obtained in seconds.

In calculating, care must always be taken that data exists appropriately for the calculation to proceed. Furthermore, the calculation is always organized sequentially, starting in the home square and moving along the rows and down the columns. It is invalid to use formulae which reference a box which has not yet been calculated. For example, it is invalid to enter a formula in box B02 which references box C05. A reference from box B02 to any box in row A or B01 is permissible.

## **GETTING AND SETTING A FORMULA**

It is often necessary to repeat a particular formula in a non-ordered set of boxes. This can be done with the GET and SET commands. First position the box cursor at the box with the formula which is to be repeated elsewhere. Press the key "G" for (G)ET. The command heading will ask "(M)AKE THE FORMULA CURRENT OR (C)HANGE." If you press "C", the program will return to the main command heading. Press M if you wish to pick up and attach the current formula to the cursor. Now move the cursor to the box where you wish to place the formula. Press S for SET and the formula will now be placed in that box.

## **ERRORS**

Three errors can cause the program to fail with a TS1500 error code in the bottom

left-hand corner.

2/5000 means you have used the continue option in the main menu without first having entered the program. Run again but this time use the E option first.

C/5110 means you have used a box in a formula which contains characters rather than numerals.

2/5110 means you have used a blank box in a formula so that the result is undefined. If either of the latter 2 errors occurs you may return to the program and the table you were using by typing GOTO 9000. The program will then display the identity of the square which it was trying to calculate when an error occurred. Press the key ENTER. The display will return to the table and you may then move the cursor to the problem square. Look at the formula for this box and see which box the formula is referencing which is either blank or which contains characters.

## SUMMARY OF COMMANDS ON THE TABLE

- C— Calculate the currently defined table
- D— Delete the formula in the current box with the cursor
- F— Enter a formula at the current box
- G— Get or attach the formula in the current box to the cursor  
Use with Set command for moving the formula around the table
- H— Home the cursor to the top left-hand box A01
- L— Load data or names into the current box
- P— Copy the screen to the printer
- Q— Quit or exit VU-CALC from the table to the main menu
- S— Set the current formula down in the current box. Use with the get command
  - Move the cursor to the right
  - ← Move the cursor to the left
  - ↑ Move the cursor up
  - ↓ Move the cursor down

DELETE — delete the last character typed in with the F or L commands

ENTER — end the input string for the F or L commands